

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
 TWENTY FIRST CENTURY SCIENCE
 CHEMISTRY A**

A322/01

Unit 2 Modules C4 C5 C6 (Foundation Tier)

WEDNESDAY 18 JUNE 2008

Afternoon
 Time: 40 minutes

Candidates answer on the question paper.

Additional materials (enclosed):

None

Calculators may be used.

Additional materials: Pencil
 Ruler (cm/mm)



Candidate
 Forename

Candidate
 Surname

Centre
 Number

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Candidate
 Number

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INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 42.
- The Periodic Table is printed on the back page.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	9	
2	3	
3	7	
4	5	
5	2	
6	3	
7	13	
TOTAL	42	

This document consists of **12** printed pages.

Answer **all** the questions.

1 The Periodic Table shows how many elements there are.

(a) Here are symbols for some chemical elements.

K Na P Po S Sn

Which of these symbols is for sodium?

answer

Which of these symbols is for potassium?

answer[2]

(b) Elements in the Periodic Table have their electrons arranged in different ways.

Draw a straight line from each **electron arrangement** to its matching **statement**.

You may draw more than one line to each statement.

electron arrangement

statement

2.1

This element has one
electron in the outer shell.

2.8.1

This element has two
electrons in the outer shell.

2.8.2

This element has three
electrons in the outer shell.

2.8.3

[3]

(c) Some of the elements in the Periodic Table are halogens.

(i) Draw a straight line from the name of each **halogen** to its **colour**.

Draw a straight line from the name of each **halogen** to its **state** at room temperature.

colour	halogen	state
black/purple	chlorine	solid
green	bromine	liquid
orange/red	iodine	gas

[3]

(ii) Chlorine reacts with coloured dyes.

What colour will the dye change to?

Put a **ring** around the best answer.

blue **green** **orange/red** **colourless**

[1]

[Total: 9]

2 Air contains oxygen, nitrogen, carbon dioxide and water vapour.

(a) Put ticks (✓) in the boxes to show which of these are **elements** and which are **compounds**.

	elements	compounds
oxygen		
carbon dioxide		
nitrogen		
water vapour		

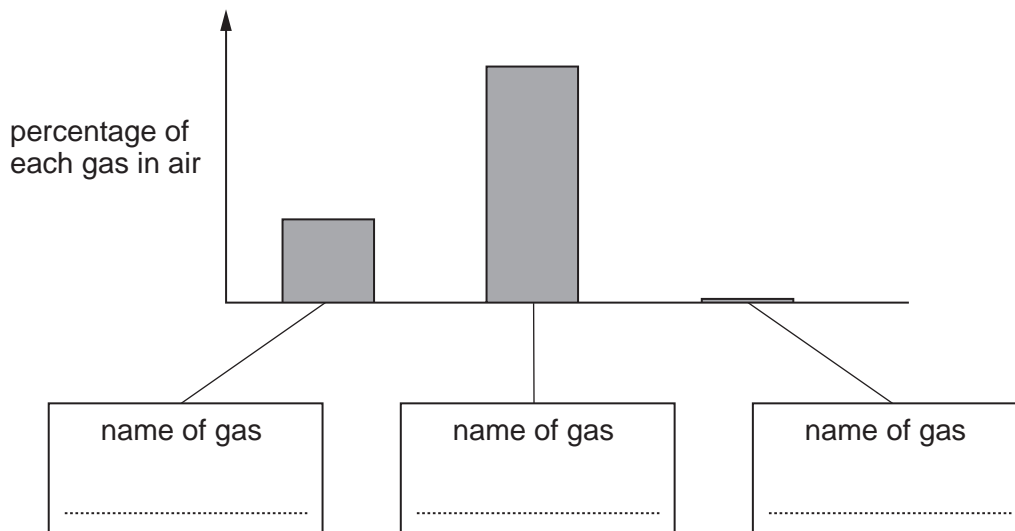
[2]

(b) The amounts of three of these gases in the air are:

nitrogen	78%
oxygen	21%
carbon dioxide	0.04%

The bar chart shows these three gases.

Fill in the labels.



[1]

[Total: 3]

3 (a) Sodium chloride forms ionic crystals.

Here are some statements about crystals of sodium chloride.

Write **T** in the box next to each **true** statement and **F** in the box next to each **false** one.

	T (true) or F (false)
Each crystal contains many molecules of NaCl.	<input type="checkbox"/>
The bonds between the particles are strong.	<input type="checkbox"/>
The bonds are all on the outside of the crystal.	<input type="checkbox"/>
There is a very large number of bonds.	<input type="checkbox"/>
The particles in the crystal are held together by attraction between opposite charges.	<input type="checkbox"/>
The particles are arranged in a regular way.	<input type="checkbox"/>





[3]

(b) Put ticks (✓) in the boxes next to the **two** statements which explain why sodium chloride has a high melting point.

Each crystal contains many molecules of NaCl.	<input type="checkbox"/>
The bonds between the particles are strong.	<input type="checkbox"/>
The bonds are all on the outside of the crystal.	<input type="checkbox"/>
There is a very large number of bonds.	<input type="checkbox"/>
The particles are arranged in a regular way.	<input type="checkbox"/>

[2]

(c) Mary asks her friends to describe what happens when ionic crystals melt.

 <p>Arnold Ions form.</p>	 <p>Craig Ions melt.</p>
 <p>Brenda Ions are there all the time.</p>	 <p>Daniel Ions start to move freely.</p>

Which **two** people are correct?

..... and[2]

[Total: 7]

4 Here are the ten most abundant elements in the Earth's lithosphere.

element	percentage in the Earth's lithosphere
aluminium	7.5
calcium	3.4
hydrogen	0.9
iron	4.7
magnesium	1.9
oxygen	49.0
potassium	2.4
sodium	2.6
silicon	26.0
titanium	0.6

(a) Which is the most abundant element on this list?

answer

Which is the third most abundant element on this list?

answer[2]

(b) Most of the silicon is in the form of silicon dioxide.

What type of substance is silicon dioxide?

Put a (ring) around the **best** answer.

compound gas mixture element ore

[1]

(c) Silicon dioxide is the main substance in one of these types of rock.

What is the name of this type of rock?

Put a (ring) around the correct answer.

chalk coal limestone sandstone

[1]

(d) The crust makes up one part of the lithosphere.

Put a (ring) around the name of the other part.

atmosphere hydrosphere magma mantle

[1]

[Total: 5]

5 Bobby reads that helium was discovered on the Sun in 1868. Thirty years later it was found on Earth. He asks his friends why helium was discovered on the Sun first.



Antoine
It is a man-made element, so none existed in 1868.



Brendan
It took thirty years for the helium to get from the Sun to the Earth.



Carol
In 1868, new ways of examining the light from the Sun had just been developed.



Delia
There is much more helium on the Sun than on the Earth.



Elton
Elements on the Sun are not the same as on the Earth.

Which **two** people give the best answers?

..... and[2]

[Total: 2]

6 Chemicals used in medicines are produced to high levels of purity.

Put ticks (✓) in the **three** boxes which show why.

Impurities might have side effects.

Manufacturers can charge more for pure chemicals.

That way the dose is the same every time.

Each medicine is designed to do one job only.

Otherwise it would be impossible to test new medicines properly.

All substances work better if they are as pure as possible.

Tablets can be made smaller if the chemicals are purer.

[3]

[Total: 3]

7 Amy reacts different chemicals with hydrochloric acid.

(a) Put a (ring) around the name of the reaction between an acid and an alkali.

concentration electrolysis neutralisation reduction

[1]

(b) Draw a straight line from the name of each **chemical** to its **formula**.

chemical	formula
hydrochloric acid	Mg
magnesium	Mg(OH) ₂
magnesium oxide	MgO
magnesium hydroxide	HCl

[3]

(c) Complete the table to show what is formed in each reaction.

Put ticks (✓) in the correct boxes.

The first one has been done for you.

reaction	reaction forms		
	a salt	hydrogen gas	water
magnesium oxide and acid	✓		✓
magnesium and acid			
magnesium hydroxide and acid			

[3]

(d) Complete the names of the salts formed.

alkali	acid	salt
magnesium oxide	sulfuric acid	magnesium
copper oxide	hydrochloric acid	copper

[2]

(e) When hydrochloric acid reacts with sodium hydroxide, which pair of ions react?

- A H^+ and Cl^-
- B H^+ and OH^-
- C H^+ and H^+
- D Na^+ and OH^-

answer[1]

(f) Impure salts can be purified by using the following techniques.

Draw a straight line from each **technique** to **what the technique is for**.

technique	what the technique is for
dissolving	removes a solid from a mixture of a liquid and a solid
crystallisation	removes a liquid by heating
evaporation	makes a solid appear in a solution
filtration	turns a solid into a solution

[3]

[Total: 13]

END OF QUESTION PAPER

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The Periodic Table of the Elements

		1	2	3	4	5	6	7	0										
		<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 1 H hydrogen 1 </div>							<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 4 He helium 2 </div>										
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Key relative atomic mass atomic symbol name atomic (proton) number </div>																	
		<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 7 Li lithium 3 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 9 Be beryllium 4 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 11 Na sodium 11 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 12 Mg magnesium 12 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 13 Al aluminium 13 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 14 Si silicon 14 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 15 P phosphorus 15 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 16 S sulfur 16 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 17 Cl chlorine 17 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 18 Ar argon 18 </div>								
		<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 19 K potassium 19 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 20 Ca calcium 20 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 21 Sc scandium 21 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 22 Ti titanium 22 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 23 V vanadium 23 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 24 Cr chromium 24 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 25 Mn manganese 25 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 26 Fe iron 26 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 27 Co cobalt 27 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 28 Ni nickel 28 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 29 Cu copper 29 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 30 Zn zinc 30 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 31 Ga gallium 31 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 32 Ge germanium 32 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 33 As arsenic 33 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 34 Se selenium 34 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 35 Br bromine 35 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 36 Kr krypton 36 </div>
		<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 37 Rb rubidium 37 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 38 Sr strontium 38 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 39 Y yttrium 39 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 40 Zr zirconium 40 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 41 Nb niobium 41 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 42 Mo molybdenum 42 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 43 Tc technetium [98] </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 44 Ru ruthenium 44 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 45 Rh rhodium 45 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 46 Pd palladium 46 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 47 Ag silver 47 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 48 Cd cadmium 48 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 49 In indium 49 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 50 Sn tin 50 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 51 Sb antimony 51 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 52 Te tellurium 52 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 53 I iodine 53 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 54 Xe xenon 54 </div>
		<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 55 Cs caesium 55 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 56 Ba barium 56 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 57 La* lanthanum 57 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 72 Hf hafnium 72 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 73 Ta tantalum 73 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 74 W tungsten 74 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 75 Re rhenium 75 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 76 Os osmium 76 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 77 Ir iridium 77 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 78 Pt platinum 78 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 79 Au gold 79 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 80 Hg mercury 80 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 81 Tl thallium 81 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 82 Pb lead 82 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 83 Bi bismuth 83 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 84 Po polonium 84 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 85 At astatine 85 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> 86 Rn radon 86 </div>
		<div style="border: 1px solid black; padding: 2px; display: inline-block;"> [223] Fr francium 87 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> [226] Ra radium 88 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> [227] Ac* actinium 89 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> [261] Rf rutherfordium 104 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> [262] Db dubnium 105 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> [266] Sg seaborgium 106 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> [264] Bh bohrium 107 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> [277] Hs hassium 108 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> [268] Mt meitnerium 109 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> [271] Ds darmstadtium 110 </div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> [272] Rg roentgenium 111 </div>	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.